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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/889,537	10/25/2001	James Lucas	THOM-0016	5316

7590 03/24/2003

John W Caldwell
Woodcock Washburn Kurtz Mackiewicz & Norris
One Liberty Place 46th Floor
Philadelphia, PA 19103

EXAMINER
DOLE, TIMOTHY J

ART UNIT	PAPER NUMBER
2858	

DATE MAILED: 03/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/889,537	LUCAS ET AL.	
	Examiner	Art Unit	
	Timothy J. Dole	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 October 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: curve A and curve B in figure 12. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: "becomea" should be "become a" on page 4, line 23; "an apparatus for determining" is written twice in a row on page 5, line 2; and "-180° C" should be "-180°" on page 18, line 16.

Appropriate correction is required.

Claim Objections

3. Claims 1-15 are objected to because of the following informalities: Claim 1 recites the limitation "the fluid" on line 8, for which there is no antecedent basis. Claims 2-15 are objected to since they depend on claim 1. Claim 5 recites the limitations "the boundary of the resonant cavity comprises a conductive wall whose inner surface is covered by said electrically insulating layer by which the wall is electrically isolated from the fluid material within the cavity." which

were already recited in claim 1. Claim 6 recites the limitation "an inlet" which is already recited in claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 2, 4-9, 11, 12, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agar in view of Hafner et al.

Referring to claim 1, Agar discloses an apparatus for determining dielectric properties of an electrically conductive liquid, comprising: an electrically resonant cavity defined by an electrically conductive boundary wall (fig. 1 (1)); an inlet through which the fluid can be introduced into the interior of the cavity (fig. 1); an emitter antenna (fig. 1 (4)) and associated drive electronics (fig. 1 (2)) for emitting electromagnetic radiation to the cavity, the emitter antenna being electrically isolated (fig. 1 (5)) from fluid material within the cavity; and means for detecting resultant electromagnetic radiation within the cavity (fig. 1 (6) and (8)).

Agar does not disclose an electrically insulating layer disposed on those parts of the electrically conductive wall defining the interior wall of the cavity, said electrically insulating layer isolating the fluid from said electrically conductive boundary wall.

Hafner et al. discloses an apparatus for measuring electrically conductive liquids, comprising an electrically insulating layer (fig. 1 (6)) disposed on those parts of the electrically conductive wall defining the interior wall of the cavity, said electrically insulating layer isolating the fluid from said electrically conductive boundary wall (column 3, lines 46-49).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the insulating layer of Hafner et al. into the apparatus of Agar for the purpose of protecting the conductive boundary from damage if the liquid is corrosive whereby leading to more reliable measurements (column 1, lines 35-39).

Referring to claim 2, Agar discloses the apparatus as claimed wherein the drive electronics are adapted to operate at a range of frequencies such that a range of frequencies of electromagnetic radiation can be emitted to the cavity (column 3, lines 46-48).

Referring to claim 4, Agar discloses the apparatus as claimed wherein the antenna (fig. 1 (4)) for emitting electromagnetic radiation into the fluid material is disposed within the resonant cavity such as to project into the fluid material (fig. 1), the antenna being provided with an insulating layer (fig. 1 (5)) by which it is electrically isolated from the fluid material.

Referring to claim 5, Agar discloses the apparatus as claimed except wherein the boundary of the resonant cavity comprises a conductive wall whose inner surface is covered by said electrically insulating layer by which the wall is electrically isolated from the fluid material within the cavity.

Hafner et al. discloses an apparatus for measuring electrically conductive liquids, wherein the boundary of the resonant cavity comprises a conductive wall (fig. 1 (7)) whose inner surface is covered by said electrically insulating layer (fig. 1 (6)) by which the wall is electrically isolated from the fluid material within the cavity (column 3, lines 46-49).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the insulating layer of Hafner et al. into the apparatus of Agar for the same purpose as given in claim 1, above.

Referring to claim 6, Agar discloses the apparatus as claimed wherein the resonant cavity has an inlet (fig. 1) and an outlet (fig. 1) such that the fluid material can flow through the cavity (fig. 1 (FLUID FLOW)).

Referring to claim 7, Agar discloses the apparatus as claimed wherein the means for detecting electromagnetic radiation within the cavity comprise a receiver antenna (fig. 1 (6) and (8)) disposed within the resonant cavity and electrically isolated from the fluid material within the cavity. It should be noted that antennas (6) and (8) are similar to antenna (4) and therefore also contain insulation (5) (column 1, lines 60-67).

Referring to claim 8, Agar discloses the apparatus as claimed wherein the means for detecting electromagnetic energy within the cavity comprise electronics connected to the emitter antenna for measuring the voltage standing wave ratio (column 2, lines 30-36). It should be noted that since power and voltage are so closely related, the ratio of the received signals could be considered to represent a voltage standing wave ratio.

Referring to claim 9, Agar discloses a device (fig. 1 (10)) for monitoring constituents (fig. 1 (11) and (12)) of a fluid flow comprising an apparatus in accordance with claim 1.

Referring to claim 11, Agar discloses the device as claimed, further comprising means for measuring additional properties of the fluid flow (fig. 1 (10)) and calculating means (fig. 1 (10)) for determining, on the basis of the measured properties, the proportions of certain constituents of the flow (fig. 1 (12)).

Referring to claim 12, Agar discloses the device as claimed wherein the calculating means operates by calculating for a set of possible permutations of flow constituents the expected values of the measured properties and comparing these with the actual measured values to determine which permutation best matches the measured properties (column 4, lines 45-47).

Referring to claim 14, Agar discloses a method of determining dielectric properties of an electrically conductive fluid comprising the steps of disposing the fluid material in or passing the fluid through an apparatus in accordance with claim1 (abstract and fig. 1), emitting electromagnetic radiation into the resonant cavity by means of the antenna which is electrically isolated from the fluid (abstract and fig. 1) and detecting and analyzing the resultant electromagnetic radiation within the resonant cavity (abstract and fig. 1).

Referring to claim 15, Agar discloses the method as claimed, comprising varying the frequency of the emitted electromagnetic radiation (column 2, lines 50-53) and obtaining an indication of the amplitude of the resultant electromagnetic radiation within

the resonant cavity (column 3, lines 49-54). It should be noted that all signals have amplitude and therefore the signal obtained by the receiving elements provides indication of the amplitude of the electromagnetic wave.

6. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agar in view of Hafner et al. as applied to claims 1, 2 and 9 above, and further in view of McAdoo et al.

Referring to claim 3, Agar as modified discloses the apparatus as claimed except wherein the frequency is continuously variable.

McAdoo et al. discloses a fluid monitor wherein the frequency is continuously variable (column 5, lines 40-54). It should be noted that the frequency monitor is actually reference numeral 39 and the driver is actually reference numeral 37.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the continuously varying frequency of McAdoo et al. into the apparatus of Agar as modified for the purpose of creating more accurate data by introducing a greater number of variables (column 6, lines 46-61).

Referring to claim 10, Agar discloses the device as claimed except for measurement electronics for determining the frequency of a resonance peak corresponding to a selected resonant mode within the cavity.

McAdoo et al. discloses a fluid monitor comprising measurement electronics for determining the frequency of a resonance peak corresponding to a selected resonant mode within the cavity (column 5, lines 58-67).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the resonant frequency of McAdoo et al. into the apparatus of

Agar as modified for the purpose of providing a more accurate representation of the sample for use in determining the characteristics of the fluid (column 6, lines 46-61).

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Agar in view of Hafner et al. as applied to claims 1, 9, 11 and 12 above, and further in view of Constant.

Referring to claim 13, Agar as modified discloses the device as claimed except wherein the calculating means comprise a neural network, trained on experimental data, for determining expected quantities relating to the dielectric properties of the flow corresponding to the permutations of flow constituents.

Constant discloses a multiphase flow meter wherein the calculating means comprise a neural network (column 8, lines 31-32), trained on experimental data, for determining expected quantities relating to the dielectric properties of the flow corresponding to the permutations of flow constituents.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the neural network of Constant into the apparatus of Agar as modified for the purpose of more accurately predicting and calculating data (column 8, lines 22-30).

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patent is cited to show the state of the art with respect to the measurement of the content of oil.

USPN 5,389,883 to Harper: This patent shows a resonant cavity used for determining the proportions of oil, gas and water flowing through a pipe.

The following patent is cited to show the state of the art with respect to electromagnetic flow meter housings.

USPN 4,329,879 to Appel et al.: This patent shows a tube with an insulating layer for measuring flow of a fluid using electromagnetic waves.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Dole whose telephone number is 703-305-7396. The examiner can normally be reached on Mon. thru Fri. from 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on 703-308-0750. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

TJD
March 19, 2003

Christine Oda
Christine Oda
Primary Examiner